



Analytical Laboratory

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Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: J13080546

Project Name: WWTS FGD-Routine 2013

Customer Name(s): Bill Kennedy, Wayne Chapman, Melonie Martin

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: _____ **Date:** 9/17/2013
(Signature) Jason C Perkins

Program Comments:

Please contact the Program Manager (Jason C Perkins) with any questions regarding this report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with a Qualifier indicate a deviation from the method quality system or quality control requirement. The qualifier description is found at the end of the Certificate of Analysis (sample results) under the qualifiers heading. All results are reported on a dry weight basis unless otherwise noted. Subcontracted data included on the Duke Certificate of Analysis is to be used as information only. Certified vendor results can be found in the subcontracted lab final report. Duke Energy Analytical Laboratory subcontracts analyses to other vendor laboratories that have been qualified by Duke Energy to perform these analyses except where noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2013020762	BELEWS	28-Aug-13 7:45 AM	TO	FGD Purge Eff
2013020763	BELEWS	28-Aug-13 7:50 AM	TO	EQ Tank Eff
2013020764	BELEWS	28-Aug-13 7:55 AM	TO	BioReactor 1 Inf
2013020765	BELEWS	28-Aug-13 8:00 AM	TO	BioReactor 2 Inf
2013020766	BELEWS	28-Aug-13 8:05 AM	TO	BioReactor 2 Eff
2013020767	BELEWS	28-Aug-13 8:10 AM	TO	Filter Blk
2013020768	BELEWS	05-Aug-13 9:00 AM	L. DAVIS	TRIP BLANK
7 Total Samples				

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).

☒ Yes☐ No

All Results are less than the laboratory reporting limits.

☐ Yes☒ No

All laboratory QA/QC requirements are acceptable.

☒ Yes☐ No

Report Sections Included:

☒ Job Summary Report☒ Sample Identification☒ Technical Validation of Data Package☒ Analytical Laboratory Certificate of Analysis☐ Analytical Laboratory QC Report☒ Sub-contracted Laboratory Results☐ Customer Specific Data Sheets, Reports, & Documentation☐ Customer Database Entries☒ Chain of Custody☒ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: DBA Account

Date: 9/17/2013

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J13080546**

Site: FGD Purge Eff

Collection Date: 28-Aug-13 7:45 AM

Sample #: 2013020762

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>NITRITE + NITRATE (COLORIMETRIC)</u>								
Nitrite + Nitrate (Colorimetric)	0.902	mg-N/L		0.25	25	EPA 353.2	09/09/2013 12:23	BGN9034
<u>INORGANIC IONS BY IC</u>								
Bromide	88	mg/L		5	50	EPA 300.0	09/10/2013 00:58	JAHERMA
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	258	ug/L		5	100	EPA 245.1	09/06/2013 10:51	DKJOHN2
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	231	mg/L		0.5	10	EPA 200.7	09/03/2013 11:13	MHH7131
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	330	ug/L		10	10	EPA 200.8	09/13/2013 13:05	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	308	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
Cadmium (Cd)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
Chromium (Cr)	305	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
Copper (Cu)	179	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
Nickel (Ni)	255	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
Selenium (Se)	3870	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
Zinc (Zn)	291	ug/L		10	10	EPA 200.8	09/12/2013 12:47	DJSULL1
<u>SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)</u>								
Vendor Parameter	Complete					Vendor Method		V_AS&C

Site: EQ Tank Eff

Collection Date: 28-Aug-13 7:50 AM

Sample #: 2013020763

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	167	ug/L		2.5	50	EPA 245.1	09/06/2013 10:53	DKJOHN2
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	201	mg/L		0.5	10	EPA 200.7	09/03/2013 11:17	MHH7131
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	143	ug/L		10	10	EPA 200.8	09/13/2013 13:08	DJSULL1

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J13080546**

Site: EQ Tank Eff

Collection Date: 28-Aug-13 7:50 AM

Sample #: 2013020763

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	229	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1
Cadmium (Cd)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1
Chromium (Cr)	240	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1
Copper (Cu)	128	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1
Nickel (Ni)	196	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1
Selenium (Se)	3130	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1
Zinc (Zn)	213	ug/L		10	10	EPA 200.8	09/12/2013 12:50	DJSULL1

Site: BioReactor 1 Inf

Collection Date: 28-Aug-13 7:55 AM

Sample #: 2013020764

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>NITRITE + NITRATE (COLORIMETRIC)</u>								
Nitrite + Nitrate (Colorimetric)	2.0	mg-N/L		0.02	2	EPA 353.2	09/09/2013 12:42	BGN9034
<u>Mercury by EPA 200.8 - (Analysis Performed by Applied Speciation and Consulting, LLC)</u>								
Vendor Parameter	Complete	ug/l				Vendor Method		V_AS&C
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	177	mg/L		0.5	10	EPA 200.7	09/03/2013 11:21	MHH7131
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	96.7	ug/L		10	10	EPA 200.8	09/13/2013 13:12	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
Cadmium (Cd)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
Chromium (Cr)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
Copper (Cu)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
Nickel (Ni)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
Selenium (Se)	73.2	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
Zinc (Zn)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:54	DJSULL1
<u>SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)</u>								
Vendor Parameter	Complete					Vendor Method		V_AS&C

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J13080546**

Site: BioReactor 2 Inf
Collection Date: 28-Aug-13 8:00 AM

Sample #: 2013020765
Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>Mercury by EPA 200.8 - (Analysis Performed by Applied Speciation and Consulting, LLC)</u>								
Vendor Parameter	Complete	ug/l				Vendor Method		V_AS&C
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	188	mg/L		0.5	10	EPA 200.7	09/03/2013 11:25	MHH7131
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1
Cadmium (Cd)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1
Chromium (Cr)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1
Copper (Cu)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1
Nickel (Ni)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1
Selenium (Se)	12.0	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1
Zinc (Zn)	< 10	ug/L		10	10	EPA 200.8	09/12/2013 12:57	DJSULL1

Site: BioReactor 2 Eff
Collection Date: 28-Aug-13 8:05 AM

Sample #: 2013020766
Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>NITRITE + NITRATE (COLORIMETRIC)</u>								
Nitrite + Nitrate (Colorimetric)	< 0.01	mg-N/L		0.01	1	EPA 353.2	09/09/2013 12:32	BGN9034
<u>INORGANIC IONS BY IC</u>								
Bromide	97	mg/L		5	50	EPA 300.0	09/10/2013 01:17	JAHERMA
<u>Mercury by EPA 200.8 - (Analysis Performed by Applied Speciation and Consulting, LLC)</u>								
Vendor Parameter	Complete	ug/l				Vendor Method		V_AS&C
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	199	mg/L		0.5	10	EPA 200.7	09/03/2013 11:29	MHH7131
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 5	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1
Cadmium (Cd)	< 5	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1
Chromium (Cr)	< 5	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1
Copper (Cu)	< 5	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1
Nickel (Ni)	< 5	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1
Selenium (Se)	5.62	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1
Silver (Ag)	< 5	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1
Zinc (Zn)	< 5	ug/L		5	5	EPA 200.8	09/12/2013 13:00	DJSULL1

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J13080546**

Site: BioReactor 2 Eff

Collection Date: 28-Aug-13 8:05 AM

Sample #: 2013020766

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)</u>								
Vendor Parameter	Complete					Vendor Method		V_AS&C
<u>TOTAL DISSOLVED SOLIDS</u>								
TDS	15000	mg/L		25	1	SM2540C	09/03/2013 14:52	DSBAKE1

Site: Filter Blk

Collection Date: 28-Aug-13 8:10 AM

Sample #: 2013020767

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	1.10	ug/L		1	1	EPA 200.8	09/13/2013 12:44	DJSULL1

Site: TRIP BLANK

Collection Date: 05-Aug-13 9:00 AM

Sample #: 2013020768

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	< 0.05	mg/L		0.05	1	EPA 200.7	09/03/2013 10:48	MHH7131
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1
Cadmium (Cd)	< 1	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1
Chromium (Cr)	< 1	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1
Copper (Cu)	< 1	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1
Nickel (Ni)	< 1	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1
Selenium (Se)	1.06	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1
Silver (Ag)	< 1	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1
Zinc (Zn)	< 1	ug/L		1	1	EPA 200.8	09/12/2013 12:11	DJSULL1



**APPLIED SPECIATION
AND CONSULTING, LLC**

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September 9, 2013

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078
(704) 875-5245

Project: Belews – FGD WWTS (Bi-Monthly Routine 2013) (LIMS# J13080546)

Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for total mercury and selenium speciation analysis on August 29, 2013. The samples were received in a sealed cooler at -0.2°C on August 30, 2013. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Mercury quantitation was performed via cold vapor inductively coupled plasma mass spectrometry (CV-ICP-MS). Any issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Russell Gerads", with a stylized flourish at the end.

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews – FGD WWTS (Bi-Monthly Routine 2013) (LIMS# J13080546)

September 9, 2013

1. Sample Reception

Three (3) aqueous samples were submitted for selenium speciation analysis on August 29, 2013. Three (3) additional samples were submitted for total mercury quantitation. All samples were received in acceptable condition on August 30, 2013 in a sealed container at -0.2°C.

All samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and were designated discrete sample identifiers. The 40mL borosilicate glass vials submitted for total mercury were preserved with bromine monochloride (BrCl) solution. The resulting samples were stored in a secure polyethylene container, known to be free from trace metals contamination, until the analyses could be performed.

An aliquot of each sample requiring selenium speciation evaluation was filtered (0.45µm) and each filtrate was stored in a secure, monitored cryofreezer (maintained at a temperature of -80°C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Total Mercury Quantitation by CV-ICP-MS All samples and preparation blanks for total mercury quantitation were preserved with 2% (v/v) BrCl. The resulting samples were analyzed for mercury via cold vapor inductively coupled plasma mass spectrometry (CV-ICP-MS).

Selenium Speciation Analysis by IC-ICP-CRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45 μ m) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimum interval of every ten analytical runs.

Total Mercury Quantitation by CV-ICP-MS The sample fractions for total mercury quantitation were analyzed by cold vapor inductively coupled plasma mass spectrometry (CV-ICP-MS) on September 4, 2013. Aliquots of each sample are reacted with a reductant in-line and transported to a gas-liquid separator. The volatile elemental mercury that is formed is then swept by a stream of argon gas into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and separated on the basis of their mass-to-charge ratio (m/z) by a mass spectrometer. A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Selenium Speciation Analysis by IC-ICP-CRC-MS Each sample for selenium speciation analysis was analyzed by ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS) on August 30, 2013. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic ($\text{pH} > 7$) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (CRC) containing a reaction gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with these samples were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

The eMDL for mercury has been calculated using the standard deviation of the preparation blanks preserved and analyzed concurrently with the submitted samples.

The mercury recovery for the matrix spike duplicate performed on the sample identified as Batch QC was above the established control limit of 125% (128.9%). All other quality control parameters were within acceptance limits signifying acceptable instrument performance. Since the variance is isolated to the individual analysis no corrective action was necessary.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Russell Gerads', with a stylized, cursive script.

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Total Mercury & Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS (Bi-Monthly Routine 2013)
 Contact: Jay Perkins
 LIMS #J13080546

Date: September 9, 2013
 Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Total Hg	Se(IV)	Se(VI)	SeCN	MeSe(IV)	SeMe	Unknown Se Species (n)
FGD Purge Eff	NR	253	63.4	ND (<1.5)	6.9	ND (<1.3)	0 (0)
BioReactor 1 Inf	0.228	11.9	44.9	ND (<0.36)	1.68	ND (<0.33)	2.88 (1)
BioReactor 2 Inf	0.0378	NR	NR	NR	NR	NR	NR
BioReactor 2 Eff	0.0098	ND (<0.24)	ND (<0.39)	ND (<0.36)	ND (<0.33)	ND (<0.33)	0 (0)

All results reflect the applied dilution and are reported in µg/L

NR = Analysis not requested

ND = Not detected at the applied dilution

SeCN = Selenocyanate

MeSe(IV) = Methylseleninic acid

SeMe = Selenomethionine

Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS

n = number of unknown Se species observed

Total Mercury & Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS (Bi-Monthly Routine 2013)

Contact: Jay Perkins

LIMS #J13080546

Date: September 9, 2013

Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL*	eMDL 5x	eMDL 250x	eMDL 1000x
Hg	0.0012	0.0006	0.0000	0.0005	0.0006	0.0005	0.0003	0.0015	-	-
Se(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	-	0.24	0.96
Se(VI)	0.000	0.000	0.000	0.000	0.000	0.000	0.002	-	0.39	1.6
SeCN	0.000	0.000	0.000	0.000	0.000	0.000	0.001	-	0.36	1.5
MeSe(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	-	0.33	1.3
SeMe	0.000	0.000	0.000	0.000	0.000	0.000	0.001	-	0.33	1.3

eMDL = Estimated Method Detection Limit

*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	CRM	True Value	Result	Recovery
Hg	NIST 1641d	1568	1799	114.7
Se(IV)	LCS	4.79	4.70	98.3
Se(VI)	LCS	4.74	4.50	94.8
SeCN	LCS	4.46	4.40	98.6
MeSe(IV)	LCS	3.24	2.85	88.0
SeMe	LCS	4.66	4.30	92.3

Total Mercury & Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS (Bi-Monthly Routine 2013)

Contact: Jay Perkins

LIMS #J13080546

Date: September 9, 2013

Report Generated by: Russell Gerads

Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Hg	Batch QC	0.0132	0.0129	0.0131	2.3
Se(IV)	Batch QC	312.5	289.9	301.2	7.5
Se(VI)	Batch QC	65.4	66.6	66.0	1.8
SeCN	Batch QC	ND (<1.5)	ND (<1.5)	NC	NC
MeSe(IV)	Batch QC	6.40	6.62	6.5	3.4
SeMe	Batch QC	ND (<1.3)	ND (<1.3)	NC	NC

ND = Not detected at the applied dilution

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Hg	Batch QC	2.000	2.470	122.8	2.000	2.591	128.9*	4.8
Se(IV)	Batch QC	5560	6039	103.2	5560	5950	101.6	1.5
Se(VI)	Batch QC	5045	5204	101.8	5045	5211	102.0	0.1
SeCN	Batch QC	4575	4570	99.9	4575	4582	100.2	0.3

*The recovery exceeds the established control limit of 125%. Please see narrative.



CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Page 1 of 2
DISTRIBUTION
ORIGINAL TO LAB,
COPY TO CLIENT

Duke Energy Analytical Laboratory

Mail Code MG03A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

1) Project Name	Belwus - FGD		2) Phone No:
3) Client:	WVTS (Bi-Monthly Routine 2013)		4) Fax No:
5) Business Unit:	20003	6) Process:	BMCEFGD
7) Operator:	BC00	8) Res. Center:	
9) Res. Type:		10) Res. Center:	

11) Lab ID	2000300745	12) Date	8/29/13	13) Time	1500
14) Sample Description or ID	FGD Purge Eff	15) Date	8/29/13	16) Time	0945
17) Sample Description or ID	EQ Tank Eff	18) Date	8/29/13	19) Time	1306
20) Sample Description or ID	BioReactor 1 Inf	21) Date	8/29/13	22) Time	1306
23) Sample Description or ID	BioReactor 2 Inf	24) Date	8/29/13	25) Time	1306
26) Sample Description or ID	BioReactor 2 Eff	27) Date	8/29/13	28) Time	1306
29) Sample Description or ID	Filter Bik	30) Date	8/29/13	31) Time	1306
32) Sample Description or ID	Metals Trip Bik	33) Date	8/29/13	34) Time	1306

35) Customer to complete all appropriate non-shaded areas.	36) Analyses Required	37) Comp.	38) Grab	39) TDS	40) Br (Dionex)	41) Metals* + Hg 245.1**	42) Se (IMS), filtered	43) NO3-NO2	44) Hg 200.8 (V_AS&C)	45) Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies)
35) Customer to complete all appropriate non-shaded areas.	36) Analyses Required	37) Comp.	38) Grab	39) TDS	40) Br (Dionex)	41) Metals* + Hg 245.1**	42) Se (IMS), filtered	43) NO3-NO2	44) Hg 200.8 (V_AS&C)	45) Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies)

46) Date	8/29/13	47) Time	0945	48) Signature	AS&C
49) Date	8/29/13	50) Time	0945	51) Signature	AS&C
52) Date	8/29/13	53) Time	0945	54) Signature	AS&C
55) Date	8/29/13	56) Time	0945	57) Signature	AS&C
58) Date	8/29/13	59) Time	0945	60) Signature	AS&C
61) Date	8/29/13	62) Time	0945	63) Signature	AS&C
64) Date	8/29/13	65) Time	0945	66) Signature	AS&C
67) Date	8/29/13	68) Time	0945	69) Signature	AS&C
70) Date	8/29/13	71) Time	0945	72) Signature	AS&C
73) Date	8/29/13	74) Time	0945	75) Signature	AS&C
76) Date	8/29/13	77) Time	0945	78) Signature	AS&C
79) Date	8/29/13	80) Time	0945	81) Signature	AS&C
82) Date	8/29/13	83) Time	0945	84) Signature	AS&C
85) Date	8/29/13	86) Time	0945	87) Signature	AS&C
88) Date	8/29/13	89) Time	0945	90) Signature	AS&C
91) Date	8/29/13	92) Time	0945	93) Signature	AS&C
94) Date	8/29/13	95) Time	0945	96) Signature	AS&C
97) Date	8/29/13	98) Time	0945	99) Signature	AS&C
100) Date	8/29/13	101) Time	0945	102) Signature	AS&C
103) Date	8/29/13	104) Time	0945	105) Signature	AS&C
106) Date	8/29/13	107) Time	0945	108) Signature	AS&C
109) Date	8/29/13	110) Time	0945	111) Signature	AS&C
112) Date	8/29/13	113) Time	0945	114) Signature	AS&C
115) Date	8/29/13	116) Time	0945	117) Signature	AS&C
118) Date	8/29/13	119) Time	0945	120) Signature	AS&C
121) Date	8/29/13	122) Time	0945	123) Signature	AS&C
124) Date	8/29/13	125) Time	0945	126) Signature	AS&C
127) Date	8/29/13	128) Time	0945	129) Signature	AS&C
130) Date	8/29/13	131) Time	0945	132) Signature	AS&C
133) Date	8/29/13	134) Time	0945	135) Signature	AS&C
136) Date	8/29/13	137) Time	0945	138) Signature	AS&C
139) Date	8/29/13	140) Time	0945	141) Signature	AS&C
142) Date	8/29/13	143) Time	0945	144) Signature	AS&C
145) Date	8/29/13	146) Time	0945	147) Signature	AS&C
148) Date	8/29/13	149) Time	0945	150) Signature	AS&C
151) Date	8/29/13	152) Time	0945	153) Signature	AS&C
154) Date	8/29/13	155) Time	0945	156) Signature	AS&C
157) Date	8/29/13	158) Time	0945	159) Signature	AS&C
160) Date	8/29/13	161) Time	0945	162) Signature	AS&C
163) Date	8/29/13	164) Time	0945	165) Signature	AS&C
166) Date	8/29/13	167) Time	0945	168) Signature	AS&C
169) Date	8/29/13	170) Time	0945	171) Signature	AS&C
172) Date	8/29/13	173) Time	0945	174) Signature	AS&C
175) Date	8/29/13	176) Time	0945	177) Signature	AS&C
178) Date	8/29/13	179) Time	0945	180) Signature	AS&C
181) Date	8/29/13	182) Time	0945	183) Signature	AS&C
184) Date	8/29/13	185) Time	0945	186) Signature	AS&C
187) Date	8/29/13	188) Time	0945	189) Signature	AS&C
190) Date	8/29/13	191) Time	0945	192) Signature	AS&C
193) Date	8/29/13	194) Time	0945	195) Signature	AS&C
196) Date	8/29/13	197) Time	0945	198) Signature	AS&C
199) Date	8/29/13	200) Time	0945	201) Signature	AS&C
202) Date	8/29/13	203) Time	0945	204) Signature	AS&C
205) Date	8/29/13	206) Time	0945	207) Signature	AS&C
208) Date	8/29/13	209) Time	0945	210) Signature	AS&C
211) Date	8/29/13	212) Time	0945	213) Signature	AS&C
214) Date	8/29/13	215) Time	0945	216) Signature	AS&C
217) Date	8/29/13	218) Time	0945	219) Signature	AS&C
220) Date	8/29/13	221) Time	0945	222) Signature	AS&C
223) Date	8/29/13	224) Time	0945	225) Signature	AS&C
226) Date	8/29/13	227) Time	0945	228) Signature	AS&C
229) Date	8/29/13	230) Time	0945	231) Signature	AS&C
232) Date	8/29/13	233) Time	0945	234) Signature	AS&C
235) Date	8/29/13	236) Time	0945	237) Signature	AS&C
238) Date	8/29/13	239) Time	0945	240) Signature	AS&C
241) Date	8/29/13	242) Time	0945	243) Signature	AS&C
244) Date	8/29/13	245) Time	0945	246) Signature	AS&C
247) Date	8/29/13	248) Time	0945	249) Signature	AS&C
250) Date	8/29/13	251) Time	0945	252) Signature	AS&C
253) Date	8/29/13	254) Time	0945	255) Signature	AS&C
256) Date	8/29/13	257) Time	0945	258) Signature	AS&C
259) Date	8/29/13	260) Time	0945	261) Signature	AS&C
262) Date	8/29/13	263) Time	0945	264) Signature	AS&C
265) Date	8/29/13	266) Time	0945	267) Signature	AS&C
268) Date	8/29/13	269) Time	0945	270) Signature	AS&C
271) Date	8/29/13	272) Time	0945	273) Signature	AS&C
274) Date	8/29/13	275) Time	0945	276) Signature	AS&C
277) Date	8/29/13	278) Time	0945	279) Signature	AS&C
280) Date	8/29/13	281) Time	0945	282) Signature	AS&C
283) Date	8/29/13	284) Time	0945	285) Signature	AS&C
286) Date	8/29/13	287) Time	0945	288) Signature	AS&C
289) Date	8/29/13	290) Time	0945	291) Signature	AS&C
292) Date	8/29/13	293) Time	0945	294) Signature	AS&C
295) Date	8/29/13	296) Time	0945	297) Signature	AS&C
298) Date	8/29/13	299) Time	0945	300) Signature	AS&C
301) Date	8/29/13	302) Time	0945	303) Signature	AS&C
304) Date	8/29/13	305) Time	0945	306) Signature	AS&C
307) Date	8/29/13	308) Time	0945	309) Signature	AS&C
310) Date	8/29/13	311) Time	0945	312) Signature	AS&C
313) Date	8/29/13	314) Time	0945	315) Signature	AS&C
316) Date	8/29/13	317) Time	0945	318) Signature	AS&C
319) Date	8/29/13	320) Time	0945	321) Signature	AS&C
322) Date	8/29/13	323) Time	0945	324) Signature	AS&C
325) Date	8/29/13	326) Time	0945	327) Signature	AS&C
328) Date	8/29/13	329) Time	0945	330) Signature	AS&C
331) Date	8/29/13	332) Time	0945	333) Signature	AS&C
334) Date	8/29/13	335) Time	0945	336) Signature	AS&C
337) Date	8/29/13	338) Time	0945	339) Signature	AS&C
340) Date	8/29/13	341) Time	0945	342) Signature	AS&C
343) Date	8/29/13	344) Time	0945	345) Signature	AS&C
346) Date	8/29/13	347) Time	0945	348) Signature	AS&C
349) Date	8/29/13	350) Time	0945	351) Signature	AS&C
352) Date	8/29/13	353) Time	0945	354) Signature	AS&C
355) Date	8/29/13	356) Time	0945	357) Signature	AS&C
358) Date	8/29/13	359) Time	0945	360) Signature	AS&C
361) Date	8/29/13	362) Time	0945	363) Signature	AS&C
364) Date	8/29/13	365) Time	0945	366) Signature	AS&C
367) Date	8/29/13	368) Time	0945	369) Signature	AS&C
370) Date	8/29/13	371) Time	0945	372) Signature	AS&C
373) Date	8/29/13	374) Time	0945	375) Signature	AS&C
376) Date	8/29/13	377) Time	0945	378) Signature	AS&C
379) Date	8/29/13	380) Time	0945	381) Signature	AS&C
382) Date	8/29/13	383) Time	0945	384) Signature	AS&C
385) Date	8/29/13	386) Time	0945	387) Signature	AS&C
388) Date	8/29/13	389) Time	0945	390) Signature	AS&C
391) Date	8/29/13	392) Time	0945	393) Signature	AS&C
394) Date	8/29/13	395) Time	0945	396) Signature	AS&C
397) Date	8/29/13	398) Time	0945	399) Signature	AS&C
400) Date	8/29/13	401) Time	0945	402) Signature	AS&C
403) Date	8/29/13	404) Time	0945	405) Signature	AS&C
406) Date	8/29/13	407) Time	0945	408) Signature	AS&C
409) Date	8/29/13	410) Time	0945	411) Signature	AS&C
412) Date	8/29/13	413) Time	0945	414) Signature	AS&C
415) Date	8/29/13	416) Time	0945	417) Signature	AS&C
418) Date	8/29/13	419) Time	0945	420) Signature	AS&C
421) Date	8/29/13	422) Time	0945	423) Signature	AS&C
424) Date	8/29/13	425) Time	0945	426) Signature	AS&C
427) Date	8/29/13	428) Time	0945	429) Signature	AS&C
430) Date	8/29/13	431) Time	0945	432) Signature	AS&C
433) Date	8/29/13	434) Time	0945	435) Signature	AS&C
436) Date	8/29/13	437) Time	0945	438) Signature	AS&C
439) Date	8/29/13	440) Time	0945	441) Signature	AS&C
442) Date	8/29/13	443) Time	0945	444) Signature	AS&C
445) Date	8/29/13	446) Time	0945	447) Signature	AS&C
448) Date	8/29/13	449) Time	0945	450) Signature	AS&C
451) Date	8/29/13	452) Time	0945	453) Signature	AS&C
454) Date	8/29/13	455) Time	0945	456) Signature	AS&C
457) Date	8/29/13	458) Time	0945	459) Signature	AS&C
460) Date	8/29/13	461) Time	0945	462) Signature	AS&C
463) Date	8/29/13	464) Time	0945	465) Signature	AS&C
466) Date	8/29/13	467) Time	0945	468) Signature	AS&C
469) Date	8/29/13	470) Time	0945	471) Signature	AS&C
472) Date	8/29/13	473) Time	0945	474) Signature	AS&C
475) Date	8/29/13	476) Time	0945	477) Signature	AS&C
478) Date	8/29/13	479) Time	0945	480) Signature	AS&C
481) Date	8/29/13	482) Time	0945	483) Signature	AS&C
484) Date	8/29/13	485) Time	0945	486) Signature	AS&C
487) Date	8/29/13				

CHAIN OF CUSTODY RECORD AND ANALYTICAL RECORD AND ANALYSIS FORM



Duke Energy Analytical Laboratory

Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only			
ORDER# J13080546	MATRIX: OTHER	Samples Originating From	NC SC
Logged By RLL	Date & Time 8/29/13 953	SAMPLE PROGRAM Water: _____ Ground NPDES Drinking Water RCRA Waste	
Cooler Temp (C) 2.0		15 Preserv.: 1=HCL 2=H ₂ SO ₄ 3=HNO ₃ 4=Ice 5=None	

19 Page 1 of 2
Page 16 of 16
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

1) Project Name Belews - FGD		2) Phone No:
3) Client: WWTS (Bi-Monthly Routine 2013)		4) Fax No:
5) Business Unit: 20003	6) Process: BMCEFGD	Mail Code:
8) Oper. Unit: BC00	9) Res. Type:	10) Reso. Center:

AS&C
PO#650910

MR #

Customer to complete all appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

Date	Time	Signature	17 Comp.	18 Grab	TDS	Br (Dionex)	Metals* + Hg 245.1**	Se (IMS), filtered	NO3-NO2	Hg 200.8 (V_AS&C)	Se, speciation - vendor to AS&C (important to place filled bottle back into both baggies)
8/28/13	0745	PO				1	1	1	1		1
	0750						1	1			
	0755						1**	1	1	1	1
	0800						1**			1	
	0805				1	1	1**		1	1	1
	0810							1			
8/5/13	0900	R. L. Davis					1**				

Filtering of the Se is performed in the field please provide a filter blank too.

Return Kit to Travis Thorton @ Belews

Customer to sign & date below - fill out from left to right.

1) Relinquished By <i>[Signature]</i>	Date/Time 8/28/13 1500	2) Accepted By COURIER	Date/Time 8/28/13
3) Relinquished By Courier	Date/Time 8/29/13 0945	4) Accepted By R. L. Davis	Date/Time 8/29/13 0945
5) Relinquished By	Date/Time	6) Accepted By:	Date/Time
7) Relinquished By <i>[Signature]</i>	Date/Time 8/29/13 1300	8) Accepted By:	Date/Time
9) Seal/Locked By <i>[Signature]</i>	Date/Time 8/29/13 1300	10) Seal/Lock Opened By:	Date/Time
11) Seal/Locked By	Date/Time	12) Seal/Lock Opened By:	Date/Time

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

21 Days _____

*7 Days _____

*48 Hr _____

*Other _____

* Add. Cost Will Apply

9-11-13

Comments

* B by TRM/ICP As, Cd, Cr, Cu, Ni, Se, Ag, Zn by TRM/IMS 1**=No Hg

Customer must Complete

Customer to complete appropriate columns to right

8/29/13